

Emergency Action Plan

Duggan Dam
OR00475

Central Point, OR

Randall G Lomonaco

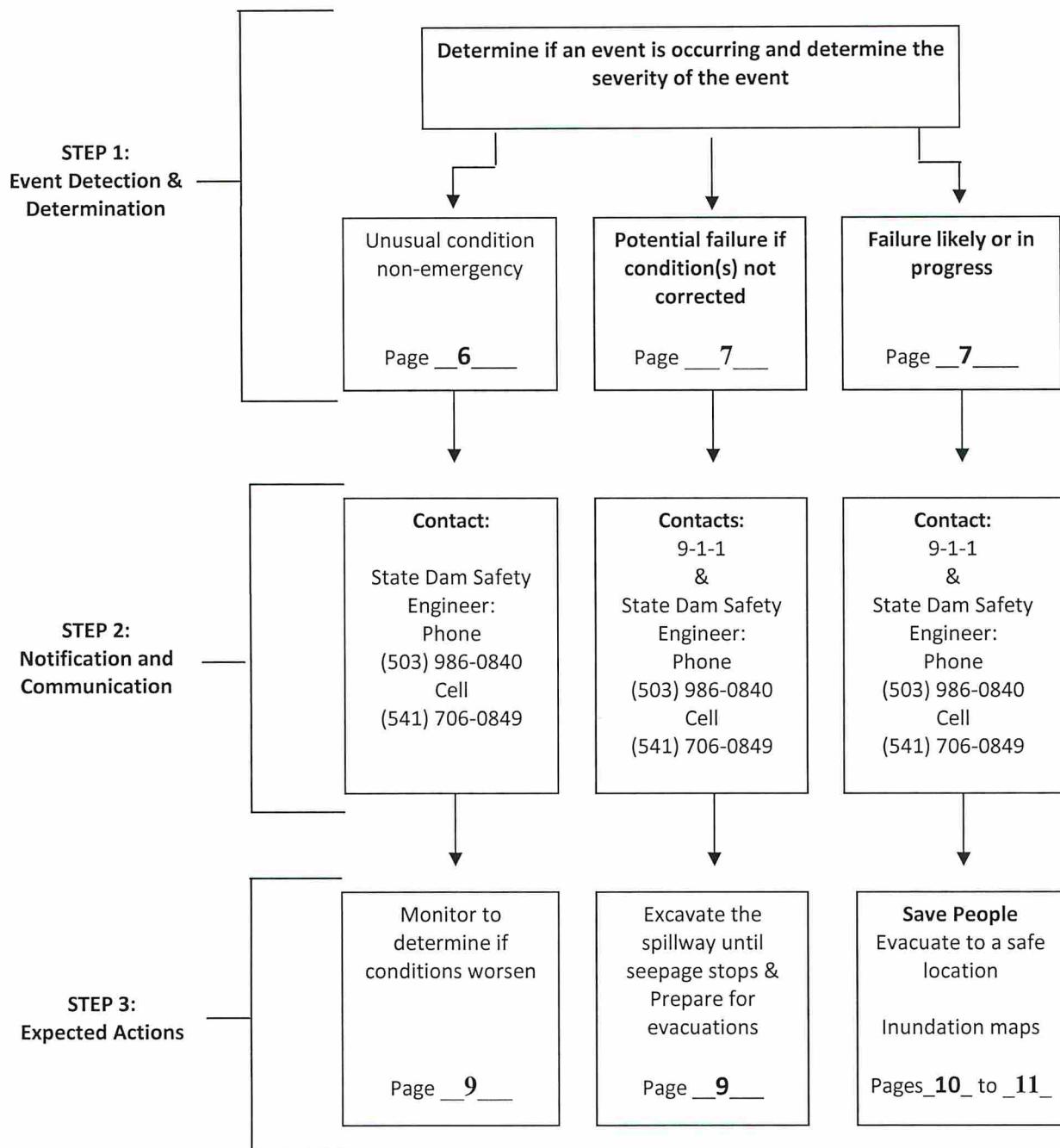
November 2016

Copy __ of __

Summary

This Emergency Action Plan (EAP) outlines the steps to be taken in the event conditions at Duggan Dam could result in a dam failure. The most likely mode of failure for Duggan Dam is from internal erosion and piping due to seepage. Seepage characteristics are indicators of potential dam safety issues. If new areas of seepage are observed or if any known areas of seepage increase in flow, a serious dam safety issue may be occurring. In addition, if the seepage is muddy, as opposed to clear, a serious dam safety issue may be occurring. In the event any seepage occurs, refer to the steps outlined in this EAP to determine the course of action. An overview of the EAP is provided on the following page.

EAP Overview



Page A. Emergency Notifications and Message

Urgent – dam failure -flooding is imminent or in progress

Call 9-1-1

Message: I am reporting an emergency at Duggan Dam at 11000 Dennis Road in Central Point, Oregon. This is Randall Lomonaco and this is an urgent emergency, the dam is failing and a dam breach flood will occur. People are in danger and need to evacuate. Please implement the emergency action plan. I am at the dam and can be reached at [provide your number]

Stay on the phone with the 9-1-1 operator until you both agree necessary information has been exchanged and the emergency response effectively initiated. After you have made emergency notifications. Refer to Page 8 in the EAP for additional detail on notifications.

Potential dam failure situation is rapidly developing

Call 9-1-1

Message: I am reporting an emergency at Duggan Dam at 11000 Dennis Road in Central Point, Oregon. This is Randall Lomonaco the owner of the property. At this time it is a potential dam failure emergency. Please inform Jackson County Emergency Services, and make other emergency contacts as necessary to prepare for possible evacuations. I am at the dam and can be reached at [provide your number]. We are taking emergency actions to save the dam, and will contact the State Dam Safety engineer for technical advice on preventing dam failure.

Stay on the phone with the 9-1-1 operator until you both agree necessary information has been exchanged and the response effectively initiated. Refer to Page 8 in the EAP for additional detail on notifications.

Table of Contents

EMERGENCY ACTION PLAN.....	1
1.0 STEP 1: EVENT DETECTION & DETERMINATION.....	6
2.0 STEP 2: NOTIFICATIONS AND COMMUNICATION	8
3.0 STEP 3: EXPECTED ACTIONS.....	9
4.0 INUNDATION MAPS AND EVACUATION PLANS	11
5.0 RECORD OF HOLDERS OF CONTROL COPIES	12
6.0 CONCURRENCES.....	12
APPENDIX A: AVAILABLE LOCAL RESOURCES.....	13
APPENDIX C: GLOSSARY OF TERMS.....	14

1.0 Step 1: Event Detection & Determination

This step describes the detection of an unusual or emergency event. Information is provided herein to assist the dam owner in determining the appropriate emergency level for the event.

1.1 Event Detection

The most realistic mode of failure for this dam is failure due to internal erosion and piping. Internal erosion occurs when seeping water begins to move dam material out of the dam. When internal erosion increases to the point in which channels (or “pipes”) have formed where dam material has been removed, piping results. These pipes provide an easy route for water to pass through the dam, carrying with it even more dam material.

A small volume of clear seepage is common on most earthen dams. However, if the normal amount of seepage increases or a new area of seepage appears, it can indicate a more serious problem. In addition, muddy seepage often indicates internal erosion of the dam, and is very serious. Sinkholes in the dam or whirlpools in the reservoir next to the dam can also indicate dam safety problems.

If these conditions are present, detail on determining whether it is an actual Emergency, and the emergency classification, is found below.

Even if an event is not listed above, any atypical situation that is or poses of risk of flooding downstream as a result of the dam is a potential emergency situation. Normal and safe passage of flood waters (where flow is not increased as a result of the dam) are not emergency situations.

1.2 Emergency Classification Determination

After an unusual or emergency event is detected and verified, the Dam Owner is responsible for classifying the event into one of the following three emergency types of emergencies from the most severe to ones that require attention that are not life threatening:

1.2.1 Non-Emergency Incident; Unusual event; slowly developing situation

A non-emergency is an unusual condition that warrants inspection and monitoring for changes. A potential dam failure exists when conditions affecting dam safety are rapidly changing and emergency actions, including repair, are essential. It is also essential that emergency managers are notified so that they can prepare if the situation worsens and evacuations are needed. However, the dam is not at imminent risk of failure (hours). For unusual conditions and potential failure conditions, the dam owner should consult with the State Dam Safety Engineer and their engineer as needed to make determination the appropriate emergency classification, if any.

Indicators of an unusual event:

- A never before observed seep location in the downstream face or abutment of the dam is identified.
- There is a noticeable increase flow at an existing seep or drain over a period of a week or less that is not related to or justified by high reservoir levels.
- There is a small and clear leak through animal hole or root hole (*less than 20 gallons per minute*).
- Deposits of material likely eroded from the dam are observed at seepage locations or below internal drain pipes, with clear drainage water.

1.2.2 Potential dam failure situation, rapidly developing

This situation may eventually lead to dam failure and flash flooding downstream, but there is not an immediate threat of dam failure. The dam owner should closely monitor the condition of the dam and notify and periodically report the status of the situation to the State Dam Safety Engineer. As time permits, remedial actions should be taken to delay, moderate, or prevent failure of the dam. If the dam condition worsens and failure becomes imminent, the Local Emergency Manager must be notified immediately of the change in the emergency level to evacuate the people at risk downstream.

The State Dam Safety Engineer should be contacted to evaluate the situation and recommend remedial actions to prevent failure of the dam. The dam owner should initiate remedial repairs (note local resources that may be available – see Appendix A Resources Available). Time available to employ remedial actions may be only hours so rapid deployment is a must.

This emergency level is also applicable when flow through the spillway has, or is expected to, result in flooding of downstream areas where people near the channel could be endangered. Emergency services should be on alert to initiate evacuations or road closures if the flooding increases.

Indicators of a Potential Failure:

- Rapidly increasing seepage is observed and measured (*doubling in a week or less*).
- There is rapid leakage though the dam (*over 1-5 cfs*).
- There is muddy seepage coming directly out of the dam.
- There is a new sinkhole (*2 foot diameter and over 6 inches deep*).
- A whirlpool is observed in the reservoir near the dam and this whirlpool is not associated with spillway flow.
- A boil (water upwelling with critical hydraulic gradient) is observed in the dam, or just below the dam.
- The reservoir level is falling without apparent cause.

1.2.3 Urgent; dam failure is imminent or in progress

For an imminent failure condition the priority is to notify 9-1-1 in order to save lives. Actions at the dam under an imminent failure condition should be to protect persons on site, delay the flood if possible, and inform emergency managers on status of flooding at the dam. Guidance to determine emergency classification is organized the same way as emergency detection in step 1. The following criteria are guidelines, since actual failure situations are unique.

Indicators of an Urgent Failure:

- Internal piping erosion in dam is observed, is still occurring, and flow exceeds 10 cfs.
- There is a sinkhole over 3 feet in diameter in the dam, and the sinkhole is getting larger over a period of a day or less.
- A sinkhole or pipe has caused drop in portion of dam crest.
- There is any internal erosion causing crest drop and water to flow over crest of dam.

2.0 Step 2: Notifications and Communication

3.1 Non-emergency incident; unusual event; slowly developing situation

The Dam Owner should contact State Dam Safety Engineer and the Dam Owner's Engineer (see page 3), describe the situation, and request technical assistance on the next steps that should be taken.

3.2 Potential dam failure situation; rapidly developing

The Dam Owner should contact 9-1-1 and the State Dam Safety Engineer (see page 3), describe the situation, and request technical assistance on the next steps that should be taken. The following message may be used to help describe the emergency situation to the Local Emergency Manager:

Message

"I am reporting an emergency at Duggan Dam at 11000 Dennis Road in Central Point, Oregon. This is Randall Lomonaco the owner of the property. At this time it is a potential dam failure emergency. Please inform Jackson County Emergency Services, and make other emergency contacts as necessary to prepare for possible evacuations. I am at the dam and can be reached at [provide your number]. We are taking emergency actions to save the dam, and will contact the State Dam Safety engineer for technical advice on preventing dam failure."

The Local Emergency Manager should contact local residents and others in the area that may be potentially affected by a failure. These people are to use this information at their discretion.

3.3 Urgent; dam failure is imminent or in progress

The Local Emergency Services (9-1-1) must be contacted immediately and the potentially flooded area must be evacuated (see *Section 4 on page 11*). The following actions should be taken:

- 1) Call 911 and be sure to say, "**This is an emergency**". The following message may be used to help describe the emergency situation to the Local Emergency Manager:

Message

"I am reporting an emergency at Duggan Dam at 11000 Dennis Road in Central Point, Oregon. This is Randall Lomonaco and this is an urgent emergency, the dam is failing and a dam breach flood will occur. People are in danger and need to evacuate. Please implement the emergency action plan. I am at the dam and can be reached at [provide your number]"

- 2) Keep in frequent contact with the Local Emergency Manager to keep them up-to-date on the condition of the dam. They will tell you how you can help handle the emergency.
- 3) If all means of communication are lost: (1) try to find out why, (2) try to get to another radio or telephone that works, or (3) get someone else to try to reestablish communications. If these means fail, handle the immediate problems as well as you can, and periodically try to reestablish contact with the Local Emergency Manager and emergency services.

3.0 Step 3: Expected Actions

3.1 Non-emergency incident; unusual event; slowly developing situation

- A. The Dam Owner should inspect the dam. At a minimum, inspect the full length of the upstream slope, crest, downstream toe, and downstream slope. Also check the reservoir area, abutments, and downstream channel for signs of changing conditions. If increased seepage and/or erosion is observed, immediately report the observed conditions to the State Dam Safety Engineer; refer to Step 2 above for guidance in determining the appropriate event level for the new condition and recommended actions.
- B. Record all contacts that were made and all information, observations, and actions. Note the time of changing conditions. Document the situation with photographs and video if possible.
- C. The Dam Owner should contact the State Dam Safety Engineer and Dam Owner's Engineer and request technical staff to investigate the situation and recommend corrective actions.

3.2 Potential dam failure situation; rapidly developing

- A. The Dam Owner should call 9-1-1 to inform them that the EAP has been activated and, if current conditions get worse, the emergency level may increase and the emergency situation may require evacuation. Preparations should be made for possible road closures and evacuations.
- B. The Dam Owner should report the situation to the State Dam Safety Engineer and the Dam Owner's Engineer.
- C. Emergency remedial actions:
Excavate the emergency spillway channel until the seepage stops
- D. Provide updates to the Local Emergency Manager to assist them in making timely decisions concerning the need for warnings, road closures, and evacuations.
- E. If time permits, the Dam Owner should inspect the dam. At a minimum, inspect the full length of the upstream slope, crest, downstream toe, and downstream slope. Also check the reservoir

area, abutments, and downstream channel for signs of changing conditions. If piping, increased seepage and/or erosion are observed, immediately report the observed conditions to the Local Emergency Manager and State Dam Safety Engineer. Refer to the emergency level table for guidance in determining the appropriate event level for the new condition and recommended actions.

- F. Record all contacts that were made and all information, observations, and actions taken. Note the time of changing conditions. Document the situation with photographs and video, if possible.

3.3 Urgent; dam failure is imminent or in progress

- A. The Dam Owner shall immediately call 9-1-1 followed by the State Dam Safety Engineer.
- B. The Local Emergency Manager shall lead the efforts to carry out warnings, close roads, and evacuate people at risk downstream from the dam (see Appendix A).
- C. The Local Emergency Manager shall alert the general public and immediately evacuate at-risk people and close roads as necessary.
- D. The Dam Owner shall maintain continuous communication and provide the Local Emergency Manager with updates of the situation to assist him in making timely decisions concerning warnings and evacuations.
- E. The Dam Owner should record all contacts that were made and all information, observations, and actions taken. Note the time of changing conditions. Document the situation with photographs and video, if possible.
- F. Advise people monitoring the dam to follow safe procedures. Everyone should stay away from any of the failing structures or slopes and out of the potential breach inundation areas.

4.0 Inundation Maps and evacuation plans

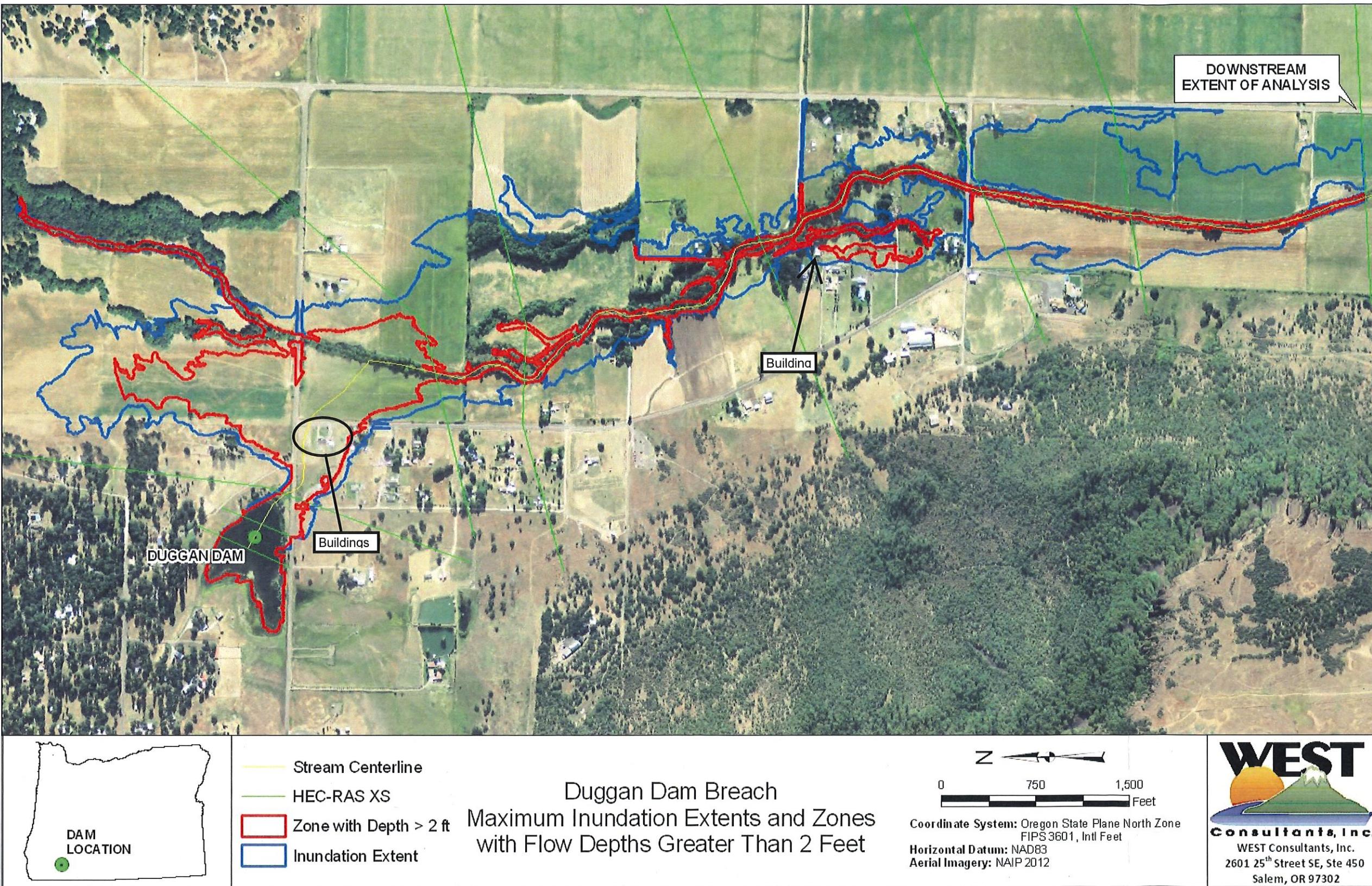


Figure 3. Maximum Inundation Extents and Zones with Flow Depths Greater Than 2 Feet for Breach Failure of Duggan Dam

5.0 Record of Holders of Control Copies

Copy Number	Organization	Person receiving Copy
1	Owner	Randal Lomonaco
2	Oregon Water Resources Department 725 Summer Street NE, Suite A Salem, OR 97301	Keith Mills

6.0 Concurrences

1.  OWES State Engineer 11-17-16
Signature Organization Date

Printed Name and Title:

2.  11-4-16
Signature Organization Date

Printed Name and Title: Keith Mills, Oregon State Dam Safety Engineer

3. _____
Signature Organization Date

Printed Name and Title:

Appendix A: Available Local Resources

Heavy equipment service and rental					
Name:		Name:		Name:	
Address:		Address:		Address:	
Other					
Name:		Name:		Name:	
Address:		Address:		Address:	

Appendix C: Glossary of Terms

Abutment	That part of the valley side against which the dam is constructed. The left and right abutments of dams are defined with the observer looking in the downstream direction from the dam.
Acre-foot	A unit of volumetric measure that would cover one acre to a depth of one foot. One acre-foot is equal to 43,560 cubic feet or 325,850 gallons.
Appurtenant Structures	Ancillary features of a dam such as outlets, spillways, powerplants, tunnels, etc.
Boil	A disruption of the soil surface due to water discharging from below the surface. Eroded soil may be deposited in the form of a ring (miniature volcano) around the disruption.
Breach	An opening through a dam that allows the uncontrolled draining of a reservoir. A controlled breach is a constructed opening. An uncontrolled breach is an unintentional opening caused by discharge from the reservoir. A breach is generally associated with the partial or total failure of the dam.
Conduit	A closed channel (round pipe or rectangular box) that conveys water through, around, or under the dam.
Control section	A usually level segment in the profile of an open channel spillway above which water in the reservoir discharges through the spillway.
Dam	A man-made barrier, together with appurtenant structures, constructed above the natural surface of the ground for the purpose of impounding water.
Dam failure	The uncontrolled release of a dam's impounded water.
Dam Owner	Any person, private or non-profit company, special district, federal, state, or local government agency, or any other entity in direct routine control of a dam and reservoir, and/or directly involved in the physical operation and maintenance of a dam, or proposes to construct a dam.
Drain, blanket	A layer of pervious material placed to facilitate drainage of the foundation and/or embankment.
Drain, chimney	A vertical or inclined layer of pervious material in an embankment to facilitate and control drainage of the embankment fill.
Drain, toe	A system of pipe and/or pervious material along the downstream toe of a dam used to collect seepage from the foundation and embankment and convey it to a free outlet.
Drainage area (watershed)	The area that drains to a particular point on a river or stream.
Drawdown	The difference between a water level and a lower water level in a reservoir within a particular time.

Emergency	A condition that develops unexpectedly, endangers the structural integrity of the dam and/or downstream human life and property, and requires immediate action.
Emergency Action Plan (EAP)	A written document prepared by the dam owner, describing a detailed plan of actions for response to emergency or unusual events, including alerting and warning emergency officials in the event of a potential or imminent dam failure or other emergency related to the safety of the dam and public.
Engineer	A Professional Engineer registered and licensed by the State of Oregon. The Engineer must be sufficiently qualified and experienced in the design, construction, and safety evaluation of the type of dam under consideration.
Filter	One or more layers of granular material graded (either naturally or by selection) so as to allow seepage through or within the layers while preventing the migration of material from adjacent zones.
Freeboard	The vertical dimension between the crest (or invert) of the emergency spillway and the crest of the dam.
Groin	That area along the intersection of the face of a dam and the abutment.
Hazard Classification	The placement of a dam into one of four categories (High, Significant, Low, No Public Hazard) based on the hazard potential derived from an evaluation of the probable incremental adverse consequences due to failure or improper operation of the dam.
Head Cutting	Erosion that extends in an upstream direction.
Height, Jurisdictional	The vertical dimension measured from the elevation of the lowest point of the natural surface of the ground, or from the invert of the outlet pipe if excavated below the natural surface of the ground, whichever is lower, where the low point occurs along the longitudinal centerline of the dam, up to the spillway crest of the emergency spillway.
Instrumentation	An arrangement of devices installed into or near dams that provide measurements to evaluate the structural behavior and other performance parameters of the dam and appurtenant structures.
Inundation Map	A map depicting the area downstream from a dam that would reasonably be expected to be flooded in the event of a failure of the dam.
Local Emergency Manager	Person(s) responsible for developing, organizing and exercising a community's emergency operations plan. Typically City Police or Fire Department or County Sheriff's Department personnel act as the Local Emergency Manager.
Notification	To immediately inform appropriate individuals, organizations, or agencies about a potentially emergency situation so they can initiate appropriate actions.
Outlet	A conduit (usually regulated by gates or valves) used for controlled or regulated releases of impounded water from the reservoir.
Piping	The progressive destruction of an embankment or embankment foundation by internal erosion of the soil by seepage flows.
Reservoir	A body of water impounded by a dam.

Seepage	The natural movement of water through the embankment, foundation, or abutments of the dam.
Slide	The movement of a mass of earth down a slope on the embankment or abutment of the dam.
Spillway	An appurtenant structure that conducts overflows from a reservoir.
Spillway, Principal or Service	The overflow structure designed to limit or control the operating level of a reservoir, and first to be activated in runoff conditions.
Spillway, Emergency	The appurtenant structure designed to pass the Inflow Design Flood in conjunction with the routing capacity of the reservoir and any principal or service spillway(s).
Spillway crest	The elevation of the floor of a spillway, grade control structure, or ogee crest above which spillway flow begins.
State Dam Safety Engineer	For purposes of this EAP, Office of the State Engineer division or local field office engineer responsible for safety inspections and determining the safe reservoir storage level of assigned dams.
Toe of dam	The junction of the upstream or downstream face of an embankment with the ground surface.
Top of dam (crest of dam)	The elevation of the uppermost surface of an embankment which can safely impound water behind the dam.